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EXAMINER	
BROOME, SAID A	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/647,250	**Applicant(s)** UEDA ET AL.	
	Examiner SAID BROOME	**Art Unit** 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 10-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7 and 10-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed on 3/31/2008.
2. Claims 1 and 11-17 have been amended by the applicant.
3. Claims 3-7 and 10 are original.
4. Claims 2, 8 and 9 have been cancelled.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-7 and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marusich (US 2002/0198693) in view of Ludke et al. (US Patent 6,219,060).

Regarding claim 1, Marusich teaches a method of generating mesh data which represent a characteristic value associated to combined cube elements (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model...In three dimensions...cubes are...used.*") and are used in a computer analysis related to a target object (paragraph 0035 lines 4-10: "*A mesh is generated within the body to subdivide the body into a number of elements...The desired deformation, or external force is entered, typically by a user.*"), comprising:

forming grid lines orthogonally crossing each other over a target object (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*", *in which an object surface is divided into several elements, wherein the mesh may be comprised with cube elements that orthogonally cross each other over the surface of an object*, paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*");

forming cube data from mesh data obtained by dividing a target object by grid lines (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*", Fig. 3: step 2), the cube data being formed of cube elements that are mesh elements forming the target object (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*" and paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*"), wherein cube data is obtained by determining whether each of mesh elements forming the mesh data forms the target object based on a first condition of the target object in the mesh element (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed with additional, smaller elements to provide more detail, or to provide new elements with a non-deformed aspect ratio.*", *where mesh elements are determined to form the shape of an object after subdivision based on a first condition, such as determining a desired shape for the mesh, as shown in the second step of the second column of the flow chart shown in* Fig. 4);

generating combined cube elements by combining the cube elements (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed...selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less*

detail and to reduce the computations needed in areas of less interest...Adaptive meshing further includes adding or removing elements in contrast to refining or coarsening the mesh." and paragraph 0005 lines 1-7: "*…the elements used to divide the component...of the model...In three dimensions...cubes are often used.*") in accordance with a second condition so that a number of the combined cube elements is smaller than a number of cube elements (paragraph 0039 lines 8-19: "*…elements can be refined…with fewer, larger elements…*", *where elements are combined in view of a second condition, such as preventing change of the shape by repeatedly correcting an aspect ratio based on determination of an undesired shape*); and

storing the combined cube elements (paragraph 0005 lines 1-7: "*…the elements used to divide the component...of the model...In three dimensions...cubes are often used.*" and paragraph 0038 lines 4-6: "*…resulting deformation data is then utilized in any of a number of ways. It can be stored...to a user readable media, etc.*") to be used in the computer analysis related to the target object (paragraph 0038 lines 4-6: "*The resulting deformation data is then utilized...sent to a user readable media…*", Fig. 4: step 112);

wherein the combine cube elements are generated by combining neighboring elements in orthogonal planes (paragraph 0005 lines 1-7: "*…the elements used to divide the component...of the model...In three dimensions...cubes are often used.*", paragraph 0039 lines 4-15: "*...when the elements or a selected number of elements are deformed to an undesirable aspect ratio…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest.*" and Fig. 3: step 2), and a corrective action may be taken if necessary according to the second condition (*third column of the*

flowchart shown in Fig. 4, *where the mesh surface is corrected based on a second condition that provides determination of an undesired shape*),

the second condition is maintaining an aspect ratio of each of the surfaces of each of the composite cube elements within a predetermined range (paragraph 0039 lines 8-19: "*…elements can be refined…with fewer, larger elements…" and is shown in the second step of the second column* of t*he flowchart shown in* Fig. 4, *in which the aspect ratio is maintained within a desired predetermined accuracy or range*),

each of the composite cube elements has a rectangular parallelepiped shape (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements…*" and paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*", *in which elements of the subdivided surface are cube elements, therefore the elements are presented in a rectangular parallelepiped shape*), and

However, Marusich fails to teach the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. Ludke teaches the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other (col. 5 lines 10-12: "*…an aspect ratio…being the ratio of the…side…h, to…w…*", *wherein the aspect ratio of a cube element is a ratio of the length of h to w, as provided in* Fig. 1), therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the cube

elements of Marusich with the aspect ratio calculation of Ludke because this modification would enable a subdivided mesh surface to be tessellated within a desired degree of accuracy through implementing an aspect ratio of the lengths of a first and second side of a cube element comprising the surface to reduce undesired artifacts or errors caused from subdivision.

Regarding claim 3, Marusich teaches the first condition of the target object in the mesh element is a ratio of volume of the target object in the mesh element to volume of the mesh element (paragraph 0039 lines 25-28: "*…smaller elements to provide more detail, or to provide new elements with a non-deformed aspect ratio. Alternatively, selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest…An adaptive meshing change in orientation of a shared surface does not affect overall volume or the number of elements in the mesh. It allows a number of adjacent elements to improve their aspect ratio.*").

Regarding claim 4, Marusich teaches a second condition of preventing the change of the shape of the target object formed of the cube data (paragraph 0039 lines 25-27: "*An adaptive meshing change in orientation of a shared surface does not affect overall volume or the number of elements in the mesh.*", third column of Fig. 4).

Regarding claim 5, Marusich teaches a second condition of preserving the substantial shape of the target object formed of the cube data (paragraph 0039 lines 25-27: "*An adaptive meshing change in orientation of a shared surface does not affect overall volume or the number of elements in the mesh.*").

Regarding claim 6, Marusich teaches a second condition of preventing the substantial volume of the cube elements (paragraph 0039 lines 25-27: "*An adaptive meshing change in orientation of a shared surface does not affect overall volume or the number of elements in the mesh.*").

Regarding claim 7, Marusich teaches a second condition of combining the cube elements preserves the substantial volume of the cube elements (paragraph 0039 lines 25-28: "*…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest…An adaptive meshing change in orientation of a shared surface does not affect overall volume or the number of elements in the mesh. It allows a number of adjacent elements to improve their aspect ratio.*").

Regarding claim 10, Marusich teaches that the grid lines portioning the cube elements are reduced in number as the cube elements are combined to be reduced in number (paragraph 0039 lines 25-28: "*…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest…*", *where the mesh elements are formed into fewer, larger elements and the lines formed by rectangular mesh elements are therefore reduced as well*).

Regarding claims 11-13, Marusich teaches a computer readable medium for storing a program and an apparatus for executing the program (paragraph 0042 lines 3-6: "*Embodiments of the invention will hereinafter be described in the general context of computer-executable program modules containing instructions executed by a personal computer…*"), to execute a method of generating mesh data (paragraph 0014 line 7: "*The*

method includes generating a mesh…“), which represents a characteristic value associated to combined cube elements and are used in a computer analysis related to a target object (paragraph 0035 lines 4-10 - 0036 lines 1-3: “*A mesh is generated within the body to subdivide the body into a number of elements. The desired deformation…is entered, typically by a user. A number of element behavior properties are defined for the elements…element behavior properties include material properties…*“), the method comprising:

forming grid lines orthogonally crossing each other over a target object (paragraph 0035 lines 4-5: “*A mesh is generated within the body to subdivide the body into a number of elements...*”, *in which an object surface is divided into several elements, wherein the mesh may be comprised with cube elements that orthogonally cross each other over the surface of an object*, paragraph 0005 lines 1-7: “*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*“);

forming cube data from mesh data obtained by dividing a target object by grid lines (paragraph 0005 lines 1-7: “*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*“, Fig. 3: step 2), the cube data being formed of cube elements that are mesh elements forming the target object (paragraph 0035 lines 4-5: “*A mesh is generated within the body to subdivide the body into a number of elements...*” and paragraph 0005 lines 1-7: “*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*“); and

generating combined cube elements by combining the cube elements (paragraph 0039 lines 8-19: “*…elements can be refined, or re-meshed...selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less*

detail and to reduce the computations needed in areas of less interest…Adaptive meshing further includes adding or removing elements in contrast to refining or coarsening the mesh." and paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*") in accordance with a predetermined condition selected from a group consisting of preserving a substantial shape of the target object formed of the cube data (*second step of the second column of* Fig. 4, *in which the surface is subdivided within an acceptable ratio to preserve the shape after subdivision*); and

storing the combined cube elements (paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*" and paragraph 0038 lines 4-6: "*…resulting deformation data is then utilized in any of a number of ways. It can be stored…to a user readable media, etc.*") to be used in the computer analysis related to the target object (paragraph 0038 lines 4-6: "*The resulting deformation data is then utilized…sent to a user readable media…*", Fig. 4: step 112);

wherein the combine cube elements are generated by combining neighboring elements in orthogonal planes (paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*", paragraph 0039 lines 4-15: "*…when the elements or a selected number of elements are deformed to an undesirable aspect ratio…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest.*" and Fig. 3: step 2), and a corrective action may be taken if necessary according to the second condition (*third column of the*

flowchart shown in Fig. 4, *where the mesh surface is corrected based on a second condition that provides determination of an undesired shape*),

However, Marusich fails to teach the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. Ludke teaches the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other (col. 5 lines 10-12: "*…an aspect ratio…being the ratio of the…side…h, to…w…*", *wherein the aspect ratio of a cube element is a ratio of the length of h to w, which are orthogonal to each other, as shown in* Fig. 1), therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the cube elements of Marusich with the aspect ratio calculation of Ludke because this modification would enable a subdivided mesh surface comprised of cube elements to be tessellated within a desired degree of accuracy through implementing an aspect ratio of the lengths of a first and second side of a cube element comprising the surface to reduce undesired artifacts or errors caused from subdivision.

Regarding claim 14, Marusich teaches a method of generating mesh data which represent a characteristic value associated to combined cube elements (paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are…used.*") and are used in a computer analysis related to a target object (paragraph 0035 lines 4-10: "*A mesh is generated within the body to subdivide the body into a number of elements…The desired deformation, or external force is entered, typically by a user.*"), comprising:

dividing a target object into a plurality of first elements using an orthogonal grid, each first element corresponds to first data (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements…*", *in which an object surface is divided into several elements, wherein the mesh may be comprised with cube elements that orthogonally cross each other over the surface of an object*, paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are…used.*", *in which the surface of a object or first data is divided into first cube elements forming orthogonal grid over the surface*);

combining the plurality of first elements according to a predetermined condition to generate a plurality of second elements, each second element corresponding to second data (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest…Adaptive meshing further includes adding or removing elements in contrast to refining or coarsening the mesh.*" and paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*", *where each combined cube element corresponds to the shape of the refined surface or second data*, paragraph 0039 lines 8-19: "*…elements can be refined…with fewer, larger elements…*"); and

storing the second elements (paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*" and paragraph 0038 lines 4-6: "*…resulting deformation data is then utilized in any of a number of ways. It can be stored…to a user readable media, etc.*") to be used in the

computer analysis related to the target object (paragraph 0038 lines 4-6: "*The resulting deformation data is then utilized...sent to a user readable media...*", Fig. 4: step 112);

wherein a number of the second elements is smaller than a number of the first elements, wherein the combined cube elements are generated by combining neighboring elements in orthogonal planes (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model...In three dimensions...cubes are often used.*", paragraph 0039 lines 4-15: "*...when the elements or a selected number of elements are deformed to an undesirable aspect ratio...selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest.*" and Fig. 3: step 2), and a corrective action may be taken if necessary (*third column of the flowchart shown in* Fig. 4, *where the mesh surface is corrected*),

However, Marusich fails to teach the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. Ludke teaches the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other (col. 5 lines 10-12: "*...an aspect ratio...being the ratio of the...side...h, to...w...*", *wherein the aspect ratio of a cube element is a ratio of the length of h to w, as provided in* Fig. 1), therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the cube elements of Marusich with the aspect ratio calculation of Ludke because this modification would enable a subdivided mesh surface to be tessellated within a desired degree of

accuracy through implementing an aspect ratio of the lengths of a first and second side of a cube element comprising the surface to reduce undesired artifacts or errors caused from subdivision.

Regarding claim 15, Marusich teaches a method of thermal fluid analysis of a target object (paragraph 0036 lines 1-6: "*…element behavior properties include material properties such as bulk modulus of a material to be modeled. In one embodiment, element behavior properties include reduced integration techniques…*", *in which mesh data analysis is provided, therefore any mesh analysis could be applied to any structural or pressure analysis, such as thermal analysis, as disclosed in the* applicant's Specification, pg. 6 lines 31-36: "*An operator inputs the structure information of an object of analysis (an object to be analyzed) as shown in FIG. 1 to the analysis tool by performing a predetermined input operation on a computer terminal installed with software forming the analysis tool…*" and pg. 7 lines 13-15: "*…inputting the structural data of the object of analysis, for thermal fluid analysis, environmental temperature and pressure…*") by generating mesh data which represent a characteristic value associated to combined cube elements (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*") and are used in a computer analysis related to a target object (paragraph 0035 lines 4-10: "*A mesh is generated within the body to subdivide the body into a number of elements...The desired deformation, or external force is entered, typically by a user.*"), comprising:

forming grid lines orthogonally crossing each other over a target object (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*", *in which an object surface is divided into several elements,*

wherein the mesh may be comprised with cube elements that orthogonally cross each other over the surface of an object, paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*");

forming cube data from mesh data obtained by dividing a target object by grid lines (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*", Fig. 3: step 2), the cube data being formed of cube elements that are mesh elements forming the target object (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*" and paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*");

generating combined cube elements by combining the cube elements (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed...selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest...Adaptive meshing further includes adding or removing elements in contrast to refining or coarsening the mesh.*" and paragraph 0005 lines 1-7: "*…the elements used to divide the component...of the model...In three dimensions...cubes are often used.*") in accordance with a predetermined condition (paragraph 0039 lines 8-19: "*…elements can be refined...with fewer, larger elements…*", *where elements are combined in view of a predetermined condition, such as preventing change of the shape by repeatedly correcting an aspect ratio based on determination of an undesired shape*); and

storing the combined cube elements (paragraph 0005 lines 1-7: "*…the elements used to divide the component...of the model...In three dimensions...cubes are often*

used.“ and paragraph 0038 lines 4-6: “*…resulting deformation data is then utilized in any of a number of ways. It can be stored…to a user readable media, etc.*“) to be used in the computer analysis related to the target object (paragraph 0038 lines 4-6: “*The resulting deformation data is then utilized…sent to a user readable media…*“, Fig. 4: step 112);

wherein the combine cube elements are generated by combining neighboring elements in orthogonal planes (paragraph 0005 lines 1-7: “*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*“, paragraph 0039 lines 4-15: “*…when the elements or a selected number of elements are deformed to an undesirable aspect ratio…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest.*“ and Fig. 3: step 2), and a corrective action may be taken if necessary (*third column of the flowchart shown in* Fig. 4, *where the mesh surface is corrected*),

However, Marusich fails to teach the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. Ludke teaches the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other (col. 5 lines 10-12: “*…an aspect ratio…being the ratio of the…side…h, to…w…*“, *wherein the aspect ratio of a cube element is a ratio of the length of h to w, as provided in* Fig. 1), therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the cube elements of Marusich with the aspect ratio calculation of Ludke because this modification

would enable a subdivided mesh surface to be tessellated within a desired degree of accuracy through implementing an aspect ratio of the lengths of a first and second side of a cube element comprising the surface to reduce undesired artifacts or errors caused from subdivision.

Regarding claim 16, Marusich teaches a method to generate mesh data (paragraph 0014 line 7: "*The method includes generating a mesh…*"), comprising:

receiving data representing a target object (paragraph 0035 lines 2-4: "*A representation of the body to be modeled is created in a simulation environment such as a computer.*", *first step of* Fig. 4);

dividing the target object into a plurality of mesh elements forming mesh data by forming grid lines orthogonally crossing each other over the target object (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*", *in which an object surface is divided into several elements, wherein the mesh may be comprised with cube elements that orthogonally cross each other over the surface of an object*, paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model…In three dimensions...cubes are...used.*");

determining whether each of the mesh elements is a cube element forming the target object based on a ratio of a volume of the target object in the mesh element and a volume of the mesh element (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed with additional, smaller elements to provide more detail, or to provide new elements with a non-deformed aspect ratio.*", *and as shown in the second step of the second column of the flow chart of* Fig. 4);

forming cube data from one or more of the mesh elements determined as the cube elements (paragraph 0039 lines 8-19: "…*elements can be refined, or re-meshed…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest…Adaptive meshing further includes adding or removing elements in contrast to refining or coarsening the mesh.*" and paragraph 0005 lines 1-7: "…*the elements used to divide the component…of the model…In three dimensions…cubes are often used.*");

determining a combination of two or more of the cube elements, the two or more of the cube elements being combinable in any of a plurality of orthogonal planes (paragraph 0039 lines 8-19: "…*elements can be refined, or re-meshed…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail…to…the mesh.*" and paragraph 0005 lines 1-7: "…*the elements used to divide the component…of the model…In three dimensions…cubes are often used.*", *in which cube elements forming the surface are combined, and as a result enables orthogonal planes to be combined*);

reducing a number of the cube elements by combining the two or more of the cube elements of the determined combination (paragraph 0005 lines 1-7: "…*the elements used to divide the component…of the model…In three dimensions…cubes are often used.*", paragraph 0039 lines 4-15: "…*when the elements or a selected number of elements are deformed to an undesirable aspect ratio…selected elements or regions of elements can be re-meshed or coarsened with fewer, larger elements to provide less detail and to reduce the computations needed in areas of less interest.*" and Fig. 3: step

2), while preserving an aspect ratio (*second step of the second column of the flowchart shown in* Fig. 4, *where the aspect ratio is preserved*); and

storing a resulting reduced set of cube elements (paragraph 0005 lines 1-7: "…*the elements used to divide the component…of the model…In three dimensions…cubes are often used.*" and paragraph 0038 lines 4-6: "…*resulting deformation data is then utilized in any of a number of ways. It can be stored…to a user readable media, etc.*"),

However, Marusich fails to teach the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. Ludke teaches the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other (col. 5 lines 10-12: "…*an aspect ratio…being the ratio of the…side…h, to…w…*", *wherein the aspect ratio of a cube element is a ratio of the length of h to w, as provided in* Fig. 1), therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the cube elements of Marusich with the aspect ratio calculation of Ludke because this modification would enable a subdivided mesh surface to be tessellated within a desired degree of accuracy through implementing an aspect ratio of the lengths of a first and second side of a cube element comprising the surface to reduce undesired artifacts or errors caused from subdivision.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 17 is rejected under 35 U.S.C. 102(e) as being anticipated by Marusich.

Regarding claim 17, Marusich discloses a method of generating cube elements for three-dimensional data, while preserving an aspect ratio (paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model...In three dimensions... cubes are often used.*" and in paragraph 0050 lines 8-11: "*The modeling element includes a good aspect ratio in the parent element and sub-elements to improve accuracy and computational efficiency.*"), comprising:

capturing original three-dimensional data (paragraph 0035 lines 2-4: "*A representation of the body to be modeled is created in a simulation environment such as a computer.*", first step of Fig. 4);

overlaying cube data over the three-dimensional data such as covering the same three dimensional space (paragraph 0035 lines 4-5: "*A mesh is generated within the body to subdivide the body into a number of elements...*" and paragraph 0005 lines 1-7: "*...the elements used to divide the component...of the model...In three dimensions... cubes are often used.*");

specifying conditions for merging the cube data overlaid on the original three-dimensional data to yield cube elements representing the original three-dimensional data (paragraph 0014 lines 12-14: "*…the instructions are operable to cause generation of a mesh of first-order tetrahedron elements that subdivide a representation of a body.*");

merging the cube data sequentially in each of three orthogonal planes including two reciprocal perpendicular directions (paragraph 0041 lines 1-13: "*…the novel modeling element includes axial symmetry…the modeling element 200 is 3-fold axially symmetric…*", *where the surfaces or planes three-dimensional data is merged or subdivided in the axial three-dimensions*), according to the specified conditions (paragraph 0041 lines 7-9: "*Axial symmetry is an advantage because the modeling element 200 can be oriented about the axis of symmetry 260 without changing the behavior of the modeling element…*");

evaluating whether the merged cube data preserve an aspect ratio of the original three dimensional data (paragraph 0005 lines 1-7: "*…the elements used to divide the component…of the model…In three dimensions…cubes are often used.*" and in paragraph 0050 lines 8-11: "*The modeling element includes a good aspect ratio in the parent element and sub-elements to improve accuracy and computational efficiency.*", *where the data is merged into cubes containing orthogonal lines*, *to preserve the aspect ratio*, Fig. 4), and taking correcting actions to improve the aspect ratio if the aspect ratio has been altered more than predetermined values (Fig. 4, *where adaptive correction is performed to correct errors*);

combining the merged data additionally without being limited to the three orthogonal planes but meeting the specified conditions and not altering the aspect ratio

beyond the predetermined values (paragraph 0039 lines 8-19: "*…elements can be refined, or re-meshed with additional, smaller elements to provide more detail, or to provide new elements with a non-deformed aspect ratio.*", Fig. 1A, *where the aspect ratio is analyzed in relation to a surface of the model, therefore the plane of the three-dimensional model is used to determine if the specified subdivision does not alter the aspect relation on a given tolerance without requiring analysis of all other planar surfaces of the model*); and

outputting the cube data merged, corrected and combined as cube elements (paragraph 0005 lines 1-7: "*...the elements used to divide the component…of the model…In three dimensions… cubes are often used.*").

Response to Arguments

Applicant's arguments with respect to claims 1, 3-7 and 10-17 have been considered but are moot in view of the new ground(s) of rejection.

The 35 U.S.C. 112 second paragraph rejection of claim 17 provided in the previous office action has been withdrawn due to the amendments to claim 17.

The applicant argues on pg. 10 1st paragraph lines 1-8 of the remarks that Marusich fails to teach that the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other. However, Ludke clearly provides an aspect ratio of the surface of composite cube elements (Fig. 1), in which the ratio is a length of a first side (h) to a length of a second side (w), where the first and second sides are orthogonal to each other (col. 5 lines 10-12: "*…an aspect ratio…being the ratio of the…side…h, to…w…*", Fig. 1).

The applicant argues on pg. 10 2nd paragraph lines 11-13 of the remarks that replacing the definition of aspect ratio provided by Marusich with the definition originally recited in claim 9 renders Marusich's approach ineffective. However, Ludke's definition of aspect ratio was relied upon to teach a ratio in which the ratio is a length of a first side to the length of a second side, wherein the first and second sides are orthogonal to each other (col. 5 lines 10-12: "*…an aspect ratio…being the ratio of the…side…h, to…w…*", Fig. 1), as provided in originally filed claim 9.

The applicant argues on pg. 11 1st paragraph lines 1-5 of the remarks that Marusich's definition of aspect ratio in view of the definition provided in claims 11-16: "the aspect ratio of each of the surfaces of each of the composite cube elements is a ratio of a length of a first side to a length of a second side of the surface, the first and second sides being orthogonal to each other", would not be operable. However, fails to teach Ludke clearly provides an operable definition of aspect ratio, in which the ratio is a length of a first side to the length of a second side that are orthogonal to each other (col. 5 lines 10-12: "*…an aspect ratio…being the ratio of the…side…h, to…w…*", Fig. 1).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAID BROOME whose telephone number is (571)272-2931. The examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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